Case Report Rapport de cas

Healing of multiple fractured thoracic dorsal spinous processes in a Quarter horse

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Abstract — A Quarter horse gelding sustained fracture and displacement of spinous processes T2–T10. Radiographic evidence of healing was seen 3 mo following injury, and at 2 years post-injury all spinous processes had healed and undergone partial re-alignment. This re-alignment has not been reported before.

Résumé — Guérison de multiples apophyses épineuses thoraciques et dorsales fracturées chez un Quarter horse. Un hongre Quarter horse a subi une fracture et un déplacement des apophyses épineuses T2–T10. Les preuves radiographiques de la guérison ont été observées 3 mois après la blessure et 2 ans après la blessure toutes les apophyses épineuses avaient guéri et subi un réalignement partiel. Ce réalignement n'avait pas été signalé auparavant.

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A 4-year-old Quarter horse gelding was presented to the Veterinary Teaching Hospital, WCVM, Saskatoon, Saskatchewan with a 1-month history of lameness and a swelling over the withers. The owners had noticed an approximately 20 cm × 20 cm swelling over the withers, a marked reluctance to walk or move the neck, and an inability to lower the neck for eating. The swelling was mostly on the left side and extended cranially under the mane approximately 8 cm. The owner suspected that the horse had fallen. Swelling and pain were reduced following administration of non-steroidal anti-inflammatory drugs by the owner for 2 wk, but increased after discontinuation of treatment.

Case description

On presentation the horse was lame at the walk; he had bilateral front limb stiffness and was not trotted for evaluation. He was reluctant to move freely, experienced pain with lateral or vertical neck movement, and had an approximately 10 cm × 10 cm swelling of the withers area, especially on the left side, which was painful to digital pressure. A hard object (suspected spinous process), approximately 2 cm diameter, could be felt in the musculature on the left side of the withers. Lateral radiographs showed fractures of the dorsal portions of spinous processes T2–T10, with the longest fragment being approximately 10 cm from the tip (Figure 1). Most fractures were comminuted, had displacement of the calcified cartilaginous tip, and were displaced (especially T5 and T6) (Figure 1). The horse was discharged with instructions for it to be confined, housed separately, water and feed to be placed at chest level to reduce neck movement, and 1 g of phenylbutazone (Butequine; Bioniche Animal Health, Belleveille, Ontario) administered orally once per day for 2–3 wk only if the owners perceived the horse to be in pain (based on lameness and reluctance to move or eat).

After 10 wk (8 in stall and 2 in pasture) the owners did not feel that the horse was lame but noticed that he did not spread his front legs as far apart as normal when grazing and when rolling he did not roll all the way onto his back or flip over. The horse was presented for re-evaluation. No lameness was evident at the walk or trot, and the withers was not swollen; however, the displaced spinous process on the left side was still palpable, painful to digital pressure, and located under the area of saddle placement. Lateral radiographs showed attempts at bony union evidenced by new bone production at the fracture sites (Figure 2). The owner was advised to continue to rest the horse.

The horse was started back into training 6 mo post-injury with bareback riding at a trot for 5 min per day. This work load was slowly increased and by 1 year he was able to walk, trot and canter under saddle for 30 min per day. Although the owner did not feel that the horse was lame he could not canter through a turn. By 2 years post-injury the horse had returned to full work under saddle without any noticeable problems or lameness at any gait or direction. He was now able to roll onto his back and flip over and the owner reported that when ridden the horse now had a higher head carriage than before the accident. On presentation the withers was visually symmetrical; however, on deep palpation there was still a firm, non-painful 2-cm diameter lump on the left side of the withers approximately 5 cm ventral

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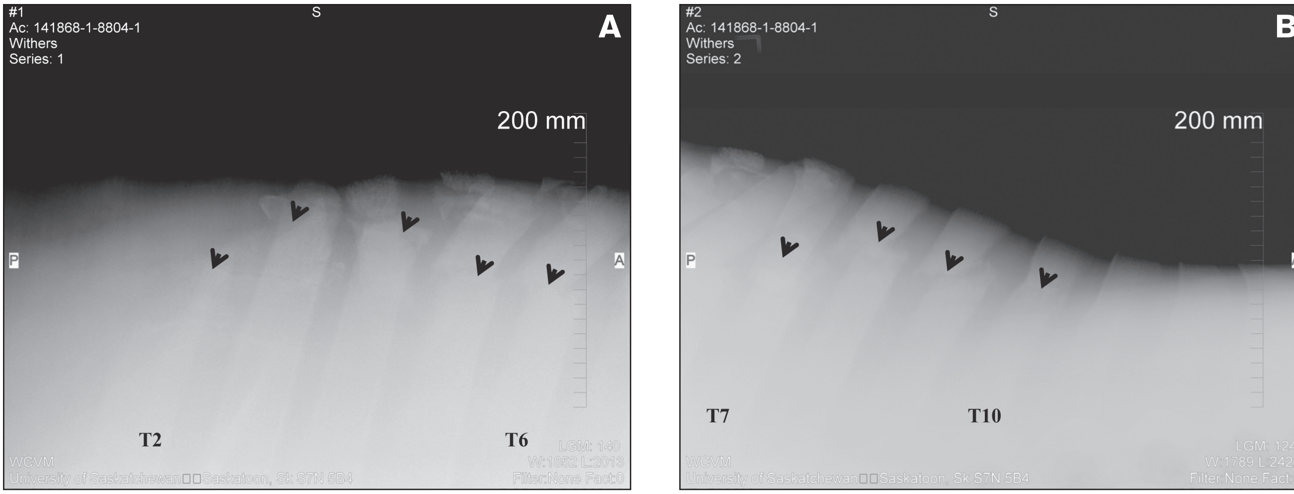

Figure 1. Initial radiographs of spinous processes. A – Cranial withers – spinous processes T2 – T6 are fractured; the middle fragments of T5 and T6 are most displaced. B – Caudal withers – fractures of spinous processes T6 – T10 are visible. Arrowheads denote fractures.

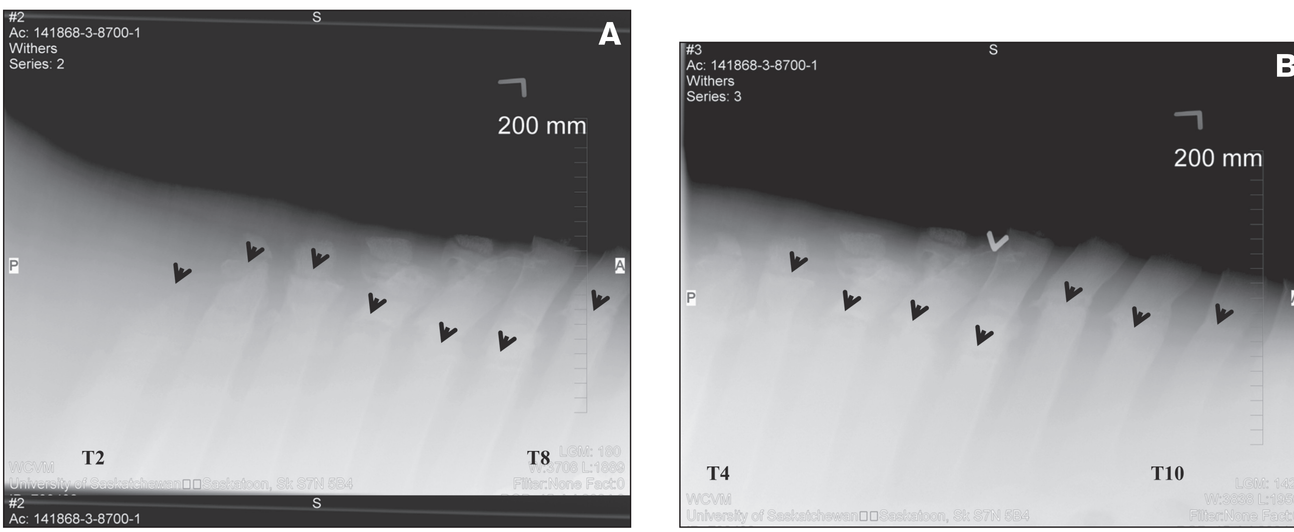

Figure 2. Radiographs of spinous processes 3 months post-injury. A – Cranial withers – new bone proliferation is seen at the fractures of spinous processes T2 – T8. B – Caudal withers – new bone proliferation is seen at the fractures of spinous processes T4 – T9; the fracture of T10 is now difficult to see. Arrowheads denote fractures.

and abaxial to the highest point of the withers. No lameness was present at the walk or trot and the horse was able to flex and bend his neck in any direction without stiffness, reluctance, or pain. Lateral radiographs showed the fractures had healed with bony union and the fragments appeared to have moved into improved alignment (Figure 3). Based on the response to rest and moderate exercise, the remodeling of the bone and no visible lameness, a good prognosis for a riding/working horse was given.

Discussion

The incidence of fractures of the spinous processes appears to be low, ranging from 0.32% to 1.81% (1,2). The fractures are commonly associated with a traumatic event such as rearing or falling over that results in impact on the withers area (3–5) where multiple spinous processes can be fractured (1,4,5).

The clinical signs are variable and neurological deficits are uncommon as concurrent fractures to the vertebral body are rare. The primary clinical signs in an acute injury are lameness/reluctance to move, reluctance to move the neck, and swelling of the withers area (2,4). Movement of the neck either laterally or vertically may produce pain, resulting in limited ambulation by the horse, and the injury may limit the ability to lower the neck for grazing (6). The fracture fragments can be displaced either cranio-caudally or axially, or both (2–4). Axial displacement might result in greater swelling on the side to which the fragments are displaced.

Presenting signs with chronic fractures include lameness or poor performance (2,6), improper saddle fitting (1), and an asymmetrical or depressed withers (1–4). The horse in this report had a number of these clinical signs. Although there was no history of trauma, the history of an initial marked bilateral

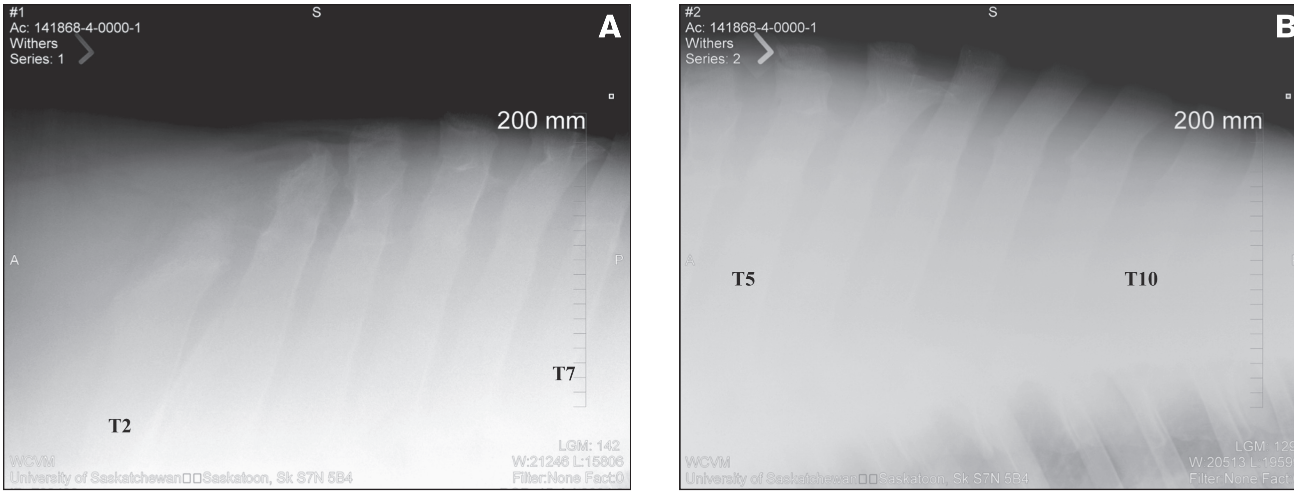

Figure 3. Radiographs of spinous processes 2 years post-injury. A – Cranial withers – spinous processes T2 – T7 are distorted in shape, but the fractures have healed and alignment of the processes is much more normal than in Figure 1. B – Caudal withers – spinous processes T4 – T10 are distorted, especially T6, but all fractures are healed.

front limb lameness, marked pain on movement of the neck, and swelling of the withers raised suspicion of fractures of the dorsal spinous processes. On presentation the signs were similar but less marked and although the withers was not depressed, the palpation of a displaced dorsal spinal process axial to the withers was highly supportive of a diagnosis of fracture.

A definitive diagnosis can be made with radiographs. As seen in this horse, the fractures frequently are multiple, comminuted and displaced (1,2,4). Radiographs can be helpful in determining the number of fractures, the severity of comminution, and the amount of displacement in a cranio-caudal direction; however, displacement axially cannot be determined because the dorsal spinous processes can only be viewed with a lateral projection.

Knowledge of the normal age-related radiographic findings of the dorsal spinous processes forming the withers can help a clinician interpret the radiographic findings (7,8). Normally all the centers of ossification are single, but occasionally there are 2 (7). The separate centers of ossification have an irregular and mottled appearance and remain incompletely ossified and separated from the parent portion of bone for the life of the horse (7,8). The dorsal spinous processes in an adult generally run parallel with T6 or T7 forming the highest point of the withers (8). Irregular new bone formation is frequently seen on both the cranial and caudal aspect of the body of the spinous processes of T2–T10 and is considered normal (7). Our patient had fracture of 9 dorsal spinal processes (T2 through to T10) with slight comminution of the body of several processes and displacement of several ossification centers. Cranio-caudal mal-alignment was especially evident with the dorsal spinous processes of T5 and T6 vertebrae (Figure 1). One of these displaced processes was likely the mass that could be felt axial to the withers. This fracture site was closed and thus no contamination was suspected.

Surgical treatment is necessary only if the fragments sequester, are impinging, or preclude use of a saddle (3,6). An excellent prognosis has been reported (4), although the authors are unaware of any large series of cases to support this belief. The prognosis may also depend on the number of fractures, the severity of displacement, and the type of healing. In a small series of 8 horses the prognosis was considered satisfactory for 6 horses and, although all horses returned to their original activity, 3 required special saddles for their deformed withers (1). Although several spinous processes of the horse herein were fractured, the return of the withers to a normal size and shape may have increased its prognosis for use under saddle. Although the tip of one spinous process could be felt deeply along 1 side of the withers it did not appear to cause problems with the saddle.

Factors that affect bone healing include the degree of comminution, amount of displacement, and stability of the fragments (9). Inadequate reduction and immobilization can predispose to delayed bony or fibrous healing (10). As seen with our case, fractures of the dorsal spinous processes commonly involve several bones, and are comminuted and displaced (1,2,4). We are unaware of any case series that radiographically evaluated the type of healing in horses with fractures of the dorsal spinous processes. However it has been reported that these fractures either have delayed healing, or heal only by a fibrous union in 4 to 6 mo (4,7). Contrary to these reports our radiographic evaluation at 3 mo post-injury showed significant attempts at bony union of all the fractured processes, and complete bony healing was seen at 2 y post-injury. An interesting point, which has not been previously reported, was the re-alignment of the spinous processes in a cranio-caudal direction. The authors are uncertain how realignment occurred but speculate that bone remodeling is only responsible for a portion of the change. Axial displacement of 1 spinous process was still present as the tip could be felt axial to the midline, but based on subjective clinical evaluation its degree of displacement was reduced. This report shows that excellent bony healing can occur for dorsal spinal processes in a reasonable time frame and that re-alignment of fracture fragments is possible with time. CVJ

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